

ROYAL BOTANIC GARDENS, KEW.

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XXXIV.—THE EXHALATION OF SCENT BY THE
FLOWERS OF MICHELIA FUSCATA.

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The flowers of *Michelia fuscata*, Blume (*Magnoliaceae*), are strongly scented at times, their odour being very similar to that of amyl acetate.

Observations have been made by Mr. W. L. Lavender on a plant of this species in the Temperate House at Kew, in relation to the scent of the flowers, and the results obtained by him are given below.

Flowers were examined on several days, five or six times each day from 6.30 a.m.* until 5.30 p.m. The records as to scent are set out separately for each day, beginning only at 11.30, because scenting of flowers was not noticed before that time. Notes on atmospheric conditions are added.

May 1†—Bright at 9.30.				May 3‡—Bright, 6.30–5.30.			
11.30—Dull, warm	...	...	Slight scent.	11.30—Slight scent.			
2.30—Bright...	...	...	Strong scent.	1.30—Fairly strong.			
5.30— „ ...	...	...	Less strong.	2.30—Strong.			
				5.30—Slight.			
May 4—6.30–9.30—Dull, wet.				May 5—Bright, 6.30–5.30.			
11.30—Dull	...	...	No scent.	11.30—Slight scent.			
1.30—Bright...	...	...	Slight scent.	2.30—Strong.			
5.0 — „ ...	...	...	Strong.	5.30—Fairly strong.			

* The experiments were made in the year 1915 and the times are therefore normal.

† A flower, picked off at 6.30 a.m. and placed on paper in a rather warmer atmosphere, was strongly scented at 11.30 a.m.

‡ A flower, picked at 6.30 a.m. and treated as in the experiment of May 1st, was strongly scented at 11.30 a.m., but had lost all its scent by 4 p.m.

<i>May 6—6.30–9.30—Bright.</i>		<i>May 18—6.30–5.30—Dull, cold, wet.</i>
11.30—Bright, close ...	Slight scent.	11.30—No scent.
2.30— " " ...	Strong.	2.30— " "
5.30— " " ...	"	3.30—Slight scent.
		5.30— " "

May 20—Dull, showery. No scent before 2 p.m. and then only slight.

The conclusions arrived at are as follows. On bright days the scent is strongest from 2.30 p.m. to 5 p.m., and then gradually diminishes. On dull days the scent is not so strong as in bright weather, and exhalation begins later.

When the morning is wet and cold, and the afternoon bright, the scent develops later and apparently remains later.

Flowers picked off and kept at a rather higher temperature on paper become scented about an hour before those left on the tree.

With the object of obtaining further data as to the influence of external conditions on the production of scent by the flowers of *Michelia*, some experiments were made in the Jodrell Laboratory. Cut flowers, with their stalks placed in water, were used, and in most cases four lots of three or four flowers each were arranged under different conditions, *e.g.*, one set of flowers in the dark, one in shade,* another in sunlight, and another in a very damp atmosphere,† either in sunlight or in shade.

The results of the experiments show that light, and moisture have a marked influence on the exhalation of the scent, which is produced only during a few hours at a time.

The scent is given off almost entirely by the perianth-leaves, but in two cases a very slight scent was detected in the central part of the flower (stamens and pistil), after the perianth leaves had fallen off. The scent of a flower may recur on two or three days, and besides this the perianth-leaves may become scented on the following day after they have dropped, or even on the second day.

The experiments were mostly begun soon after 10 a.m., the flowers being then without scent. The earliest development of scent was observed shortly before 11 a.m.

Similarly treated specimens from a batch of flowers of apparently the same age often behave somewhat differently. It is necessary therefore to repeat an experiment three or four times when only small numbers of flowers are used.

Damp air, as compared with dry, causes earlier exhalation of the scent. This was tested in sunlight and in shade, and the differences observed were from half-an-hour to one hour in the sun, and from half-an-hour to two hours in the shade. The favourable influence of moisture was shown also by the fact that damp air gave a greater proportion of scented and also of

* For the shade experiment the flowers were placed close to a north window.

† The flowers in this case were put under a small bell-jar in which the air was kept near saturation-point by means of damp blotting-paper.

strongly-scented flowers. The combined result of five experiments was:—In damp air, 5 flowers with strong scent, 3 fairly strong, 2 slight; in dry air, 2 fairly strong, 4 slight. Three of these experiments were made in shade and two in sunlight.*

A comparison of the behaviour of flowers in sunlight and in shade shows that sunlight favours the production of scent, both as regards earlier occurrence, number of flowers, and strength of odour. In four experiments the difference of time was from half-an-hour to two hours, and the numbers of flowers were:—In sun, 2 with strong scent, 8 fairly strong, 2 slight; in shade, 1 fairly strong, 6 slight.

Flowers kept in the dark were found to remain unscented in most cases. In experiments made on five days, when strong or fairly strong scent was produced in light, flowers in the dark did not become scented except on one day, and then only slightly.

In relation to the production of scent, the following appears to be the sequence of conditions from favourable to unfavourable: sun and damp, sun, shade and damp (often about equal to sun), shade, and lastly darkness.

The shade temperature in the Laboratory was 52° F. on the coldest day, and 70° F. on the hottest. These differences probably had some influence on the production of scent. A detailed comparison of the results belonging to different days would not, however, bear this out, one reason being that the brightness of the light varied to a great extent with the temperature. It may be noted, however, that on the hottest day, though this was not quite the brightest, a slightly earlier exhalation of the scent was recorded than on any other occasion, and that decided lateness of scent was observed on two of the coldest though fairly bright days.

A few experiments were made with temperatures above and below the normal range. In one case, flowers were kept in air cooled by ice to a temperature varying from 40° F. to 50° F., other flowers being in the Laboratory air at about 70° F. Exhalation of scent began at 11.30 a.m. from the flowers at the higher temperature placed in damp air, and at 12.30 p.m. from those in dry air, but in the cooled air no scent had developed by 2.30 p.m. The ice was then removed, and the flowers from the cooled air were placed in sunlight, with the result that two of them became slightly scented by 4 p.m. On experimenting with flowers on two or three days in a greenhouse in darkness it appeared that a temperature of 75° to 80° F. slightly diminished the unfavourable influence of darkness on the production of scent, *i.e.*, as compared with the lower temperatures of the Laboratory experiments.

In one case heat was applied to some flowers towards the end of the day to see whether the scent would be revived. There were three lots of flowers, which were placed at 11 a.m. in sunlight, shade and darkness respectively. Scent was noticeable at noon in the sunlight, and at 12.30 p.m. in the shade, but

* These results may be due in part to a possible increase of the olfactory action of a given amount of the scent when distributed in damp air.

was not developed by the flowers placed in the dark. By 8 p.m. it had practically ceased in both lots of flowers exposed to the light, and entirely before 9 p.m. The three lots were then put into an oven with a temperature of 92°–100° F., and kept there until 11 p.m., but in no case was any scent developed.

An interesting feature was noticed in some of the experiments. When the same flowers were used on two successive days, it was found that an after-effect of the behaviour of the flowers on the first day may sometimes be recognised on the second day. For instance, in one experiment, flowers placed in sunlight became strongly scented, while others placed in the dark produced no scent. On the following day both lots were exposed to sunlight, and the flowers which had been in darkness on the first day became scented two hours earlier than the others. Another experiment gave a similar result with a difference of two hours and a half, and with stronger scent in favour of those flowers which had previously been in the dark.

In explanation of this phenomenon it is suggested that possibly a non-volatile substance, which yields the scent under certain external conditions, accumulates gradually (or chiefly during the night) in the cells, but becomes exhausted during energetic exhalation of scent.

The exhalation of scent probably takes place chiefly through the stomata of the perianth-leaves, but, in view of the favourable effect of damp air, it is maintained that the manufacture and not only the exit of the scent is concerned in the phenomena observed.

XXXV.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO HORTI REGII

CONSERVATARUM.

DECAS LXXXIX.

881. *Rosa* (Cinnamomeae) *elegantula*, Rolfe; affinis *R. sertatae*, Rolfe, ramis juvenilibus copiose et graciliter aciculatis et floribus duplo minoribus facile distinguenda.

Frutex ramosus, mediocris; ramuli subglabri, saepissime copiose aculeati, rarius subinermes. *Folia* conferta, 5–8 cm. longa, 7–9-foliolata; rhachis sparse glandulosa et aculeolata; foliola subsessilia, elliptica vel ovato-elliptica, obtusa, acute et simpliciter dentata, rarius subduplicato-serrata, utrinque glauca, 1–2 cm. longa; stipulae adnatae, anguste oblongae, obtusae vel subobtusae, minutissime ciliato-glandulosae, 5–6 mm. longae. *Flores* speciosi, saturate rosei, 2.5–3 cm. diametro, in ramulorum brevium apicibus solitarii vel pauci; pedunculi 2 cm. longi, laeves. *Receptaculum* anguste ovoideo-oblongum, laeve, 5–6 mm. longum. *Calycis* lobi ovato-lanceolati, caudato-acuminati, interdum subfoliacei, puberuli, minutissime ciliolati, rarissime glandulosi, circiter 1 cm. longi, patentes. *Petala* late obcordata. *Filamenta* glabra, 2–3 mm. longa, antheris aureis. *Styli* villosi, in columnam 2 mm. longam cohaerentes.

CHINA: *Wilson* 1165, 1280 (ex hort. Veitch).

A very pretty little rose, readily distinguished from *R. sertata*, Rolfe (Bot. Mag. t. 8473), by its copiously aciculate branches and by the much smaller flowers with very deep carmine-rose petals. The plants were grown from seeds collected by Mr. E. H. Wilson for Messrs. James Veitch & Sons, with whom it flowered in June, 1908, and subsequently at Kew.

882. **Carelia Berroi**, *Hutchinson* [Compositae-Eupatoriaceae]; species ramulis glabrescentibus, foliis lanceolatis, involucri bracteis glabris distincta.

Ramuli superne dense foliati, fere glabri. *Folia* opposita, lanceolata, apice sensim acuminata, basi breviter cuneato-obtusa, 2-5 cm. longa, 0.5-1.7 cm. lata, serrata, tenuiter chartacea, utrinque nervis parce puberulis exceptis glabra, infra prominulis, punctata, basi trinervia, nervis subparallelis infra prominulis; petioli 0.5-1.4 cm. longi, supra sulcatuli, fere glabri. *Capitula* numerosa, in corymbos densos ramulis dense foliatis circumdatos disposita; pedunculi ultimi 1-1.5 cm. longi, leviter angulares. *Involucri bractee* 4-seriatae, ab extremo sensim longiores, exteriores late ellipticae, apice rotundatae, circiter 3 mm. longae, interiores oblongae, usque ad 8 mm. longae, omnes dorso sulcatae, parte superiore minute puberulae, marginibus membranaceis minutissime denticulatis. *Receptaculum* rotundatum, parvum, glabrum. *Flores* numerosi, albicantes; corollae tubus 3.5 mm. longus, superne sensim ampliatus, glaber. *Achaenia* 5-angulata, 3.5 mm. longa, apicem versus parce appresse pubescentia. *Pappi paleae* breves, stramineae, apice laceratae.

URUGUAY. Cerro del Marco, amongst dry rocks, Dec., 1907, *M. B. Berro* 4554.

883. **Crepis bhotanica**, *Hutchinson* [Compositae-Cichoriaceae]; affinis *C. blattarioides*, Vill., sed foliis radicalibus sub anthesin viridibus (nec marcescentibus) caulinis basi rotundato-auriculatis, caulibus et involucri bracteis extra ubique nigropilosis differt.

Herba circiter 0.5 m. alta; caulis superne ramosus, dense nigro-pilosus. *Folia* radicalia longe petiolata, oblanceolata, basin versus sublobulata, apice obtusa, petiolo incluso usque ad 20 cm. longa, 3.5-4 cm. lata, tenuiter chartacea, remote repando-denticulata, utrinque praecipue in costa et nervis pilosula, laxa reticulata; folia caulina lanceolata, basi rotundato-auriculata, usque ad 12 cm. longa, repando-dentata et interdum lateraliter lobulata. *Capitula* nutantia, flava, longe pedunculata, pedunculis plerumque gracilibus pilosis usque ad 12 cm. longis apicem versus parce bracteatis. *Involucri bractee* subtriseriatae, exteriores anguste lineares, 6-7 mm. longae, intermediae paullo longiores, interiores circiter 1.5 cm. longae, acute acuminatae, omnes extra dense nigro-pilosae. *Corollae* apices et styli rami conspicue nigri. *Achaenia* immatura glabra. *Pappi* setae albae, 1 cm. longae.

INDIA. Bhotan: described from living specimens grown from seed communicated by Messrs. Bees, Ltd.

This species is very closely related to certain Kashmir specimens described in the Flora of British India as *C. blattarioides*, Vill., a plant of Central and Western Europe. It differs from the Kashmir species, which seems to be distinct from the European, in its narrower upper cauline leaves, slender, not thickened peduncles, and nodding capitula; and from the European *C. blattarioides* in having at the time of flowering the basal leaves quite fresh and not withered as in that species and in its rounded-auriculate, not sagittate-auriculate, cauline leaves.

884. **Phoebe goalparensis**, *Hutchinson* [Lauraceae-Persea-ceae]; affinis *P. Hainesianae*, Brandis, sed costa infra basin versus puberula (nec appresse pubescente), nervis tertiariis irregulariter ramosis, alabastris acutioribus differt.

Arbor alta, trunco paullo ramoso basi radicibus aeriis ornato, cortice viridi; ramuli ultimi minute puberuli, nigrescentes, lenticellis parvis parce instructi. *Folia* obovata vel obovato-lanceolata, basi angustata, apice sensim obtuse acuminata, 6-12 cm. longa, rigide chartacea, utrinque costa basin versus puberula excepta glabra; costa supra impressa, infra prominens; nervi laterales utrinsecus 10-12, a costa sub angulo 45° abeuntes, supra vix, infra distincte prominuli, prope marginem evanidi et flexuosi; nervi tertiarii utrinque prominuli, flexuosi; petioli 1-2.5 cm. longi, infra glabri, supra minute puberuli. *Inflorescentiae* laxae paniculatae, ramulorum apices versus subcongestae, foliis aequales vel leviter superantes, longe pedunculatae; pedicelli ultimi circiter 0.5 cm. longi, cinereo-puberuli, sicco costati; bracteolae minutissimae, caducae. *Alabastra* ovoidea, 6-7 mm. longa. *Perianthii* lobi exteriores ovati, obtusi, 4 mm. longi, 3 mm. lati, coriacei, extra puberuli, intra basin versus appresse villosuli, interiores paullo longiores, infra apicem pilis inflexis paucis ornati. *Stamina* gracilia, filamentis pubescentibus, ordinis I. et II. 4 mm. longa, antheris oblongo-ovoideis obtusis 1.5 mm. longis; ordinis III. paullo longiora, basin versus glandulis geminatis cordatis instructa; staminodia ordinis IV. sagittata, staminibus dimidio breviora. *Ovarium* depresso-globosum, pubescens; stylus 1 mm. longus. *Bacca* ellipsoidea, nitida, 2.5 cm. longa, glabra.

INDIA. Assam: Goalpara district; Aie Reserve, stem buttressed at the base, fls. Feb., fr. July, *Upendranath Kanjilal in Dehra Dun Herb.* 5092.

Vernacular—*Nikáhi*.

885. **Dioscorea asclepiadea**, *Prain et Burkill* [Dioscoreaceae]; species e sectione *Stenophora*, *D. gracillimae*, Miq. affinis, foliis hebetibus nec nitidis, inflorescentiis maris laxis nec spicatis sejungenda.

Rhizoma ut videtur horizontale. *Caules* glabri, 5-6 dm. tantum alti, penna anserina vix crassi, ima basi arcuati ibique

cataphyllis 2 membranaceis 5 mm. longis suffulti, per trientes inferiores duos more culmi holci erecti stricti, triente summo flexuosi et sextante summo tantum tantum sinistrorsum volubiles, teretes, inermes, siccitate straminei. *Folia* alterna, 2-3 inferiora aggregata rarissime tamen subopposita, caetera manifeste sparsa, membranacea, supra saturate subtus pallidior viridia, hebetia, etiam novella utrinque glaberrima, nisi reticulatione pellucida opaca, subdeltoideo-cordato-oblonga, acute acuminata, apice minutissime mucronulata, sinu basali lato, margine penitus minutissime undulata et supra aurículas basales parum obliquas leniterque iterum sublobulatas aliquantulum sinuata, 7-nervia nervis extimis 2-fidis, nervi opaci subtus prominuli, nervuli secundarii pellucidi, supra obscuri subtus subdistincti; 6-7 cm. longa, basi 4 cm. et supra aurículas basales 2.5 cm. lata; petiolus glaber, gracilis, supra canaliculatus, basi perdistincte apice parum pulvinatus, 4.5-6 cm. longus. *Racemi masculi* omnino glaberrimi in axillis foliorum nisi 2-3 imorum orti, saepissime compositi, nonnulli apicem caulis versus plane simplices, 4-5 cm. longi, 1-1.5 cm. lati, pedunculis filiformibus vix angulatis nudis 1.5-1.75 cm. longis suffulti; ramuli filiformes, inferiores 1 cm. longi, sursum gradatim abbreviati, bracteis minutis lineari-lanceolatis 1 mm. longis subditi, saepe 2-flori, nonnunquam 3-flori rarius 1-flori; pedicelli singuli cymosim dispositi, 2 mm. longi bracteolis eos opponentibus bracteis simillimis nisi brevioribus. *Perianthii masculi* urceolati laciniæ 2-seriatæ, patentes, exteriores ovatae interiores subobovatae, omnes obtusae. *Stamina* 3 aequalia, subsessilia, perianthii laciniis exterioribus opposita; antherae didymae; staminodia nulla. *Spicae foemineae* ignotae.

JAPAN. Kiu-shiu; Amakusi, mense Aprili florens, Rein.

The nearest ally in Japan of the species here described, of which only male examples have so far been seen, is *D. glaberrima*, Miq., which is the only other Japanese *Dioscorea* with but three fertile stamens. The two species further agree in having male inflorescences which may be compound and in having leaves with a finely undulate margin. The differences between *D. asclepiadea* and *D. glaberrima* are, however, very marked. The rigid slender stems in the specimens of *D. asclepiadea* examined by us are erect and stiff below, becoming flexuous only in the upper third and twining only for a short space at the top, the appearance of the plant suggesting that it is a denizen of grassy slopes; *D. glaberrima* is a considerable climber among shrubs. The leaves of *D. asclepiadea* are dull green and thinly membranous with a less conspicuous marginal undulation than in those of *D. glaberrima*, which are shining green above and firmly subcoriaceous. The male flowers of *D. asclepiadea* are distinctly to long pedicelled, those of *D. glaberrima* are sessile, and very considerably larger. Finally the three subsessile fertile stamens of *D. asclepiadea* are not accompanied by staminodes, whereas in *D. gracillima* the three episepaline fertile stamens have well developed filaments, incurved at the top, thrice as long as the anthers and are alternate with three stoutish subclavate epipetaline staminodes

as long as the filaments of the fertile stamens. For an opportunity of studying Dr. Rein's specimens we are indebted to the kindness of Professor Fischer de Waldheim.

886. **Dioscorea Bernoulliana**, *Prain et Burkill* [Dioscoreaceae]; species *D. Dugesii*, Robins., mexicanae et guatemalensi proxima sed omnino glabra et foliis pertenuibus translucetibus ex sicco pallide aeneis caulibus laevibus floribus multo minoribus facillime distinguenda.

Herba omnino glabra; *caulis* sinistrorsum volubilis, laevis, pallide stramineus. *Folia* ovato-cordata, acute acuminata, sinu basali lato saepius breviora, tenuius membranacea, translucetia et pellucido-venulosa, 7-9-nervia, 8 cm. longa lataque; *petiolus* gracilis supra canaliculatus, 4 cm. longus. *Flores* *maris* in racemis axillaribus singulis vel 2-4-nis simplicibus cymulosim dispositi; racemi ad 16 cm. longi; cymulae brevissime pedunculatae, 2-4-florae, inter se 1-3 mm. distantes, basi bracteis lanceolatis 1 mm. longis suffultae; bracteolae flores singulos subsessiles subtendentes bracteis similibus nisi minores. *Perianthium* 6-partitum subcampanulatum, 1.5 mm. latum; segmenta exteriora oblonga, interioribus parum latiora. *Stamina* 6, perianthii segmentis dimidio breviora; filamenta gracilia, basi segmentorum adnata; antherae suborbiculares, introrsae. *Rudimentum ovarii* trigonum, filamentis duplo brevius. *Flores foeminei* ignoti.

CENTRAL AMERICA. Guatemala: inter Escomillas et Palohueco; Feb. 1878, *Bernoulli & Cario* 847.

Though nearest, among Central American species of the genus *Dioscorea*, to *D. Dugesii*, Robins., the plant described above is hardly referable to the section *Macrogynodium*, as defined by Mr. Uline. It should, perhaps, if we adopt that author's system, be regarded as representing an uncharacterised group, nearly allied to *Macrogynodium*, distinguished from Mr. Uline's section by its very delicate foliage, its smaller made flowers, its less conspicuous rudimentary ovary and the absence of pubescence. In habit and foliage *D. Bernoulliana* most resembles *D. cyanisticta*, J. D. Smith in Coult. Bot. Gaz. vol. xx. p. 10 (1895) a member of the very different section *Brachystigma*, Uline, the species of which have but 3 fertile stamens. For an opportunity of studying Bernoulli & Cario n. 847 we are indebted to the kindness of Professor Fischer de Waldheim, Director of the Imperial Botanic Garden of Peter the Great, Petrograd.

The material on which Professor Robinson in 1894 originally based his *D. Dugesii* (Proc. Amer. Acad. Sci. vol. xxxix. p. 330) was obtained by Dugès in 1880 at Guanajuato, Mexico. Since then it has been found by Heyde & Lux in Guatemala; their specimens have been distributed by Mr. J. Donnell Smith as his n. 6391. In 1896 Mr. Uline published a description of *D. violacea* (Engl. Bot. Jahrb. vol. xxii. p. 423) citing under this species Pringle n. 1774 from Oaxaca, Mexico, issued as "*D. composita*, Hemsl.," and in addition Galeotti n. 5461 ♂, from Xalapa, Mexico. Some error has crept into the citation

from Mr. Pringle's lists; Pringle n. 1774 is a *Rhus* while the specimens of *D. composita*, Pringle non Hemsl., were issued as Pringle n. 4774. A similar error may have arisen with regard to Galeotti n. 5461 ♂; in the Kew collection this gathering, as was pointed out by Dr. Hemsley in 1885 (Biol. Centr. Amer. Bot. vol. iii. p. 358) is referable to *D. macrostachya*, Benth. The plant issued by Pringle under n. 4774 as *D. composita* is *D. Dugesii*, Robins., so that *D. violacea*, Uline, in so far as that species is based on Pringle's specimens, must be treated as a synonym of *D. Dugesii*. Whether Galeotti n. 5461 ♂ may elsewhere than at Kew include material of a species other than *D. macrostachya*, Benth., is a point to which attention may have to be given. In connection with Mr. Benthham's species it should, when so doing, be noted that Mr. Uline has cited under *D. macrostachya*, Benth. (Pl. Hartweg. p. 73) a specimen of Bourgeau n. 1488, collected at Cordova, Mexico, on 17 December, 1865. The specimen of Bourgeau n. 1488 in the Kew collection exhibits no character that invalidates Mr. Uline's suggestion, though that author has not noted that the specimen in question forms the basis of *D. propinqua*, Hemsl. (Biol. Centr. Amer. Bot. vol. iii. p. 359) and that, if his judgment be justified, this name should be regarded as an additional synonym of *D. macrostachya*, Benth.

887. **Dioscorea Carionis**, *Prain et Burkill* [Dioscoreaceae]; species *D. densiflorae*, Hemsl., et *D. albicauli*, Uline proxima; ab illa bracteis 2-3-plo brevioribus ab hac floribus maris pedicellatis apte distinguenda.

Herba plus minusve puberula; caulis sinistrorsum volubilis, siccitate brunnescens. *Folia* ovato-cordata vel subcordata, acute acuminata, membranacea, 7-9-nervia, nervis externis simpliciter furcatis, 7-5 cm. longa, 5-5 cm. lata, subtus secus nervos puberula; petiolus supra canaliculatus, 3-5 cm. longus, puberulus. *Flores maris* in racemis axillaribus solitariis simplicibus usque ad 20 cm. longis dispositi; singuli inter se 3-7 mm. distantes pedicellis puberulis 2 mm. longis suffulti; bractee ovato-lanceolatae, 3 mm. longae; bracteolae bracteis similes, 2 mm. longae. *Perianthium* 6-sectum, subrotatum, 5 mm. latum; segmenta ovato-lanceolata, acuta, 3-4 mm. longa, subaequalia. *Stamina* 3 episepalina, segmentis duplo breviora; filamenta crassiuscula, sursum abruptius recurvata; antherae suborbiculares, extrorsae; staminodia epipetalina 3 subelavata, filamentis sesquialongiora fertilibusque fauci tubi perianthii inserta. *Flores foemenei* ignoti.

CENTRAL AMERICA. Guatemala: S. Martin Zaratepequez; Feb. 1878, *Bernoulli & Cario* 848.

The species here described, for an opportunity of studying which we are indebted to the courtesy of Professor Fischer de Waldheim, Petrograd, is a member of the section *Oxyptalum*, Uline, agreeing with *D. densiflora* Hemsl. (Biol. Centr. Amer. vol. iii., p. 356) as regards its perianth and its pedicels, and with *D. albicaulis*, Uline (Engl. Bot. Jahrb. vol. xxii. p. 425) as

regards its bracts and bracteoles. The type of *D. albicaulis*, described in 1896, is a Guatemala plant collected by Heyde & Lux at Cerro Gordo, Santa Rosa, issued by Mr. J. Donnell Smith as n. 3869. This plant has leaves which are pubescent on the nerves beneath, not glabrous as stated in the original diagnosis, where it is inadvertently cited as n. 3569.

888. *Dioscorea melastomatifolia*, Uline MSS. ex Harms in *Herb. Kew* [Dioscoreaceae]; species *D. truncatae*, Miq., simillima sed antheris altius insertis, foliis margine vix hyalinis, caulibus sinistrorsum volubilibus apte distinguenda.

Frutex omnino glaber; caulis sinistrorsum volubilis, brunescens. *Folia* ovata summo apice apiculata, basi late cuneata vel subrotundata, membranacea, laete viridia, utrinque secus nervos venosque colorata, 3-nervia nervo intramarginale incompleto pergracile addito, 5-8 cm. longa, 1.75-4.25 cm. lata; petiolus supra canaliculatus, 0.5-1 cm. longus. *Flores* spicati, in utroque sexu pro bractea singuli. *Spicae* maris 4-5 cm. longae in paniculas axillares semel ramosas saepius 7-8 cm. longas dispositae; inferiores foliis quam caulina minoribus, superiores bracteis lanceolatis 1-1.5 cm. longis suffultae, pluriflorae; rhachis angulata brunescens; flores inter se 2-3 mm. remoti; bractee ovatae, acutae, 1 mm. longae, nonnunquam bracteolis 1-2 bracteis similibus nisi minoribus additis. *Perianthium* 6-partitum, campanulatum, maculis perpaucis rubris notatum; lobi ovati, obtusi, subaequales. *Stamina* 6; antherae fere sessiles, globosae, ad basin loborum 1-seriatim insertae. *Ovarii rudimentum* 0. *Spicae foemineae* simplices, axillares, 10-16 cm. longae pluriflorae; rhachis angulata; flores inter se 1-3 cm. remoti; bractee iis maris conformes bracteolis saepius 2 additis. *Capsula* reflexa, obovato-oblonga, apice retusa, 3.5 cm. longa, 2.5 cm. lata. *Semina* anguste oblonga, circumcirca alata; ala in lateribus quam supra et infra angustior.

SOUTH AMERICA. Brazil; Graõ Para; Santarem, Spruce 787*.

This *Dioscorea* was collected by the late Dr. Spruce in the neighbourhood of Santarem in April, 1850; his manuscript field-note reads:—'Campo. Fruit oblong-obcordate, shining, with three broad wings. Leaves oval, apiculate.' The name used for the species is given on the authority of Dr. Harms; the description here published has been prepared owing to the necessity there is for discrimination between this plant and *D. truncata*, Miq., based on specimens collected by Richard Schomburgk at Berbice in British Guiana, which Dr. Harms has treated as conspecific with the plant collected by Spruce at Santarem. In Mr. Uline's system *D. melastomatifolia* is best placed in the section *Apodostemon*, and in that portion of the section, as defined by him, wherein the plane of insertion of the stamens is circular.

889. *Dioscorea truncata*, Miq. ex R. Schomburgk in *Versuch Faun. & Flor. Brit. Guian.* p. 899—nomen tantum [Dioscoreaceae]; species *D. marginatae*, Griseb. et *D. melastomatifoliae*, Uline, brasiliensibus proxima, ab illa floribus utriusque

sexus minoribus maris singulis petiolisque brevioribus, ab hac foliis margine hyalinis antheris intra tubum corollae insertis caulibus dextrorsum volubilibus distinguenda.

Frutex omnino glaber; caulis dextrorsum volubilis, brunescens. *Folia* ovata, acuta summo apice apiculata, basi late cuneata vel subrotundata imo basi subito contracta et in petiolum anguste decurrentia, margine hyalina, papyracea, supra intense viridia subtus pallidiora et minute nigro-punctata, inferiora 5-nervia, superiora 3-nervia nonnunquam praesertim in foliis caulinis nervo intramarginale incompleto pergracili addito, 4-8 cm. longa, 2-3.5 cm. lata; petiolus supra canaliculatus, dimidio superiore anguste alatus, 1-1.5 cm. longus. *Flores* spicati in utroque sexu pro bractea singuli. *Spicae maris* in paniculam amplam terminalem iterum ramosam dispositae; rami primarii 8-16 cm. longi, inferiores foliis quam caulina parum minoribus superiores bracteis vel foliis valde redactis 2-5 mm. tantum longis suffulti; ramii secundarii (spicae propriae), 4-10 cm. longi pluriflori; rhachis angulata maculis rubris crebre notata; flores inter se 2-4 mm. remoti; bractee ovato-acuminatae, 1 mm. longae, rubro-maculatae nonnunquam bracteolis 1-2 bracteis similibus nisi multo minoribus additis. *Perianthium* 6-partitum, campanulato-rotatum, ob maculos crebros rubro-brunneum; lobi suborbiculares, exteriores interioribus parum majores. *Stamina* 6; antherae fere sessiles, globosae, prope basin tubi circa ovarii rudimentum 3-lobum sub-2-seriatim insertae. *Spicae foemineae* simplices, versus caulis apicem axillares, 10-18 cm. longae, pluriflorae; rhachis valde angulata, maculis rubris crebre notata; flores inter se 1-8 mm. remoti; bractee iis maris conformes bracteolis saepius 2 additis. *Perianthium* 6-partitum campanulato-rotatum, 8 mm. latum, rubro-brunneum; lobi suborbiculares, subaequales. *Stamina* 6; antherae imperfectae, minutae, sessiles, prope basin tubi circa stylum sub-2-seriatim insertae. *Ovarium* 5 mm. longum, viride, rubro-notatum; stylus perbrevis; stigma 3-lobum, lobis ovatis integris recurvo-explanatis. *Capsula* reflexa, obovato-oblonga, apice subtruncata, 3 cm. longa, 2-2.25 cm. lata. *Semina* circumcirca alata.—*D. parvifolia*, Sagot MSS. in Herb. Kew, non Philippi. *D. parviflora*, Benth. Mus. in Herb. Kew, non Philippi. *D. melastomatifolia*, Harms MSS. in Herb. Kew partim, non Uline.

SOUTH AMERICA. British Guiana; Berbice, *Richd. Schomburgk* 224; Berbice River, *Jenman* 1701. French Guiana; Karouany, *Sagot* 860.

The *Dioscorea* described above is a member of the section *Apodostemon*, Uline, and is referable to the subsection, recognised by Mr. Uline, in which the plane of insertion of the stamens is trigonous in outline. The species was first met with in 1837 by Dr. Richard Schomburgk, at Berbice, and was distributed, without name, as his n. 224. From Schomburgk's *Versuch einer Fauna und Flora von Britisch-Guiana*, published in 1845, we find that in the interval Professor Miquel had recognised in this Berbice *Dioscorea* an undescribed species, which he named *D. truncata*, evidently with reference to the shape of the ripe

capsule. Unfortunately Dr. Kunth, who examined most, and was responsible for the naming of some of Schomburgk's Guiana *Dioscoreas*, has neither taken up Miquel's name nor referred to Schomburgk's specimens, in the account of this genus published in 1850 in his *Enumeratio Plantarum*, vol. v., with the result that the name duly proposed for the plant has been overlooked, and that until now it has never been formally described. Schomburgk n. 224 is in female flower and fruit only, and bears the field-note "twiner, flowers reddish-brown."

The species was met with again at Karouany in French Guiana in 1855, 1856 and 1857, by Mr. P. Sagot, the specimens of 1855 being male, those of 1856 and 1857 being female. All were issued as *Herb. Sagot*, n. 860, most of the specimens as an unnamed *Dioscorea*, though one female specimen at Kew has been written as *D. parvifolia*, Sagot, by Mr. Sagot himself, while one male specimen has been written up by the late Mr. Bentham as *D. parviflora*, a more appropriate name. These names indicate that both Sagot and Bentham shared the view of Miquel; both names have been used since by Philippi for two species from Chile. In 1882 the species was collected once more by Mr. Jenman on the Berbice River, his specimen, Jenman n. 1701, being compared in *Herb. Kew*, by Professor Oliver, with the Brazilian *D. marginata*, Gris. More recently, Schomburgk n. 224, the original basis of *D. truncata*, Miq., has been identified by Dr. Harms with *D. melastomatifolia*, Uline, a Brazilian species collected by Dr. Spruce at Santarem, in male flower and in ripe fruit, in April, 1850, the specimens of which have been distributed as Spruce n. 787*. The resemblance between Schomburgk n. 224 and Spruce n. 787* is very striking, whether as regards the size and shape of the leaves, the size and disposition of the male flowers, or the size and shape of the ripe fruit and the seeds. At the same time the differences between the two are just as marked. The male flower in *D. melastomatifolia* is campanulate, not rotate-campanulate; the sessile anthers are inserted at the top of the tube, not near its base, while the plane of their insertion is circular in place of trigonous. Finally the stem in *D. melastomatifolia*, Uline, twines to the left instead of to the right as in *D. truncata*. The note by Professor Oliver on Jenman n. 1701, above alluded to, reflects much more closely the natural affinity of *D. truncata*. Grisebach's *D. marginata*, as exemplified by *Smilax spicata*, Vell. Fl. Flum. t. 112 (not Vell. l.c. t. 111 which represents a true *Smilax*) and by specimens belonging to the species figured by Velloso, collected in both sexes by Saltzmann at Bahia, agrees as regards the structure both of its male and female flowers with *D. truncata*, Miq. The two seem, however, specifically distinct. The hyaline margin of the leaf of *D. marginata* is much stronger, the petiole is considerably longer, the male corolla is twice as large, and the male flowers are clustered in place of solitary. Neither Velloso's figure nor Saltzmann's specimens admit of a definite statement as to the direction in which the stem of *D. marginata* twines, but Saltzmann's material does show that the torsion of the stem itself is to the left not to the right.

890. *Philodendron* (*Baursia*) *teretipes*, *Sprague* [Araceae—*Philodendreae*]; affine *P. Glaziovii*, Hook. f., a quo petiolis teretibus, inflorescentia minore subsessile, ovulis paucioribus distinguitur.

Caulis sub inflorescentia circiter 1–3 cm. diametro. *Folia* longipetiolata; petioli erecto-ascendentes, apice recurvati, teretes, 11–16 cm. longi, medio 6–7 mm diametro, flavidi, apicem versus rubro-tincti; petiolus folii supremi basi 1·3 cm. vaginans; laminae deflexae, lanceolatae, breviter acute acuminatae, in basin subdeltoideo-angustatae, 14·5–21·5 cm. longae, 3·8–6·2 cm. latae, marginibus leviter recurvatis rubris, basi supra petiolum anguste connatis; nervi primarii utrinsecus circiter 12, quam intermediis vix conspicuiore. *Pedunculus* communis nullus; spatha inferne ad pedunculum spadiceis adnata, 11 cm. longa, crenea, intus coccinea, apice cuspidata, parte expansa obovata 6·5 cm. longa, 3·2 cm. lata; pedunculus spadiceis 1·5 cm. longus, per totam longitudinem ad basin spathae adnatus; spadix 8·5 cm. longus, parte feminea 2 cm. longa. *Pistilla* 1·6–1·8 mm. longa, stigmatibus discoideo 1·2 mm. diametro; ovarium 7-loculare, loculis paucis ultra medium productis; ovula pro loculo 2–3, e basi erecta.

TROPICAL AMERICA. Described from a fresh specimen of a plant grown in the Royal Botanic Gardens, Glasnevin, where it was received from Mr. O'Brien in July, 1912, with the statement that it had been imported with *Zygopetalum Sanderianum*, Regel.

XXXVI.—THE AFRICAN SPECIES OF *GOUANIA*.

M. L. GREEN.

The genus *Gouania* (*Rhamnaceae*) is very widely distributed in the tropics. Its salient characteristics are the watch-spring tendrils, spike-like thyrses, a more or less lobed disc, inferior ovary and longitudinally 3-winged septicidal fruits. The fruits are crowned by the persistent receptacular cup, and their wings are formed by the united margins of adjacent carpels. When mature the fruit separates into its component carpels, and it then consists of the three mericarps suspended from and held together by the three pairs of strands into which the central columella has split up.* The strands arise in pairs at the angles of the columella, run up along the median lines of the carpels which project as narrow ridges, curve sideways a little below the apex towards the top of the wings and pass over them to their outer side where they form a raised network. This network ultimately separates from its mericarp owing to the decay of the sub-jacent parenchyma, but retains the mericarp loosely for a time until it is blown away by the wind or falls out.

* At this stage the fruit recalls that of *Heracleum Sphondylium*, Linn., except that the latter has only two mericarps, each borne on a single strand.

The fruit and its dehiscence were well described by Gaertner* as long ago as 1791 in the following words:—

“*Capsulae* tres, ope corticis communis in fructum triquetrum, rotunde trialatum ac trifariam dehiscentem coadunatae. Cortex tenuis, ex epidermide fugaci et reticulo fibroso capsularum dorso incumbenti compositus. Capsulae partiales crustaceae, duriusculae, ad utrumque suum marginem in alam rotundatam, suberosam et sebi adinstar fragilem ampliatae, hinc depressiusculae, albae, inde angulatae et ferrugineo-sphacelatae, uniloculares, evalves. *Receptaculum commune* in axi fructus positum, sexfidum, filiforme; filis per paria junctis, secundum angulum ventralem capsularum adscendentibus, deinde vero in earundem dorsum reflexis atque fibrosum rete formantibus, cujus ope capsulae in situ pendulo post dehiscentiam fructus sustentur; *proprrium* nullum, praeter cicatriculam in fundo loculamentorum, cui semina affixa sunt.”

In the Flora of Tropical Africa vol. 1. p. 383 (1868) only one species, *Gouania longipetala*, Hemsl., was recorded from Tropical Africa. The description of the flower was drawn up from specimens collected by Mann in Fernando Po and at the river Kongui, Spanish Guinea, whilst the fruit was described from a specimen collected by Kirk in Portuguese East Africa. Since 1868, however, ample fruiting material has arrived of the West African plant, and it is now evident that Kirk's specimen represents a new species, which is described below as *G. mozambicensis*. It differs from *G. longipetala* in the laxer infructescence with distinct lateral branches and the much larger fruits.

Three other species have been recorded from Tropical Africa, *G. longispicata*, Engl., *G. pannigera*, Tul. and *G. Sereti*, De Wild.

G. longispicata was described by Engler in Pflanzenw. Ost.-Afr. C. p. 256 (1895) and is widely distributed in Tropical East Africa. In the same work Engler recorded *G. pannigera* from the Zambesi Region; this species is a native of Madagascar, and was not previously known to occur in Africa. Confirmation of its occurrence there is desirable. *G. Sereti* was described by De Wildeman in Ann. Mus. Congo, Sér. V. ii. p. 45 (1907) and appears to be confined to the Belgian Congo. The differential characters of the five species may be summarised thus:—

1. *G. longipetala*, Hemsl.—*Ramuli* puberuli. *Petioles* 0·8–1 cm. longi. *Folia* subtiliter (rarius manifeste) crenulata, subtus secus nervos pilosa; nervi laterales 3–4. *Pedicelli* circiter 2 mm. longi. *Calyx* extra sparse hirsutus. *Petala* calycis lobis longiora. *Discus* in lobos haud productus. *Mericarpi* glabra, 9 mm. longa, 1·1 cm. lata.

2. *G. longispicata*, Engl.—*Ramuli* juniores ferrugineo-tomentosi, vetustiores glabri. *Petioles* 1–4 cm. longi. *Folia* acute serrulata, subtus dense tomentosa; nervi laterales 5–7. *Pedicelli* 4–5 mm. longi. *Calyx* extra tomentosus. *Petala* calycis lobis

* Gaertner, De Fructibus et Seminibus Plantarum, ii. p. 187 t. 120, fig. 4 (1791).

aequilonga. *Disci* lobi transverse oblongi, breviter retusi vel subtruncati, 0.25 mm. longi, 0.5 mm. lati. *Mericalypia* leviter hirsuta, 8 mm. longa, 9.5 mm. lata.

3. **G. pannigera**, *Tul.*—*Ramuli* ferrugineo-tomentosi. *Petoli* 1.1–1.3 cm. longi, pariter induti. *Folia* integra sed interdum margine crispatulo, apice rotundata, supra pubescentia, subtus tomentosa, nervis ferrugineis exceptis albedo-fulva; nervi laterales 5–6. *Pedicelli* circiter 1 mm. longi. *Calyx* extra tomentosus. *Petala* calycis lobis aequilonga. *Disci* lobi transverse oblongi vel subtruncati, 0.3 mm. longi, 0.5 mm. lati. *Mericalypia* dense hirsuta, circiter 8 mm. longa, 7 mm. lata.

4. **G. mozambicensis**, *M. L. Green.*—*Ramuli* juniores pilosuli, vetustiores glabri. *Petoli* 2–4 cm. longi. *Folia* inconspicue crenata vel subintegra, subtus secus nervos subappresse pilosa; nervi laterales 7–8. *Pedicelli* circiter 3 mm. longi. *Mericalypia* glabra, 1.5–1.7 cm. longa, 1.5–1.8 cm. lata.

5. **G. Sereti**, *De Wild.*—*Ramuli* breviter pilosi. *Petoli* 0.6–1.2 cm. longi, griseo-tomentosi. *Folia* crenulato-dentata, subtus albo-velutina. *Pedicelli* 3–5 mm. longi, tomentosi. *Calyx* extra sparse pilosus, lobis 1.5 mm. longis. *Petala* calycis lobos haud superantia. *Disci* lobi profunde bilobulati. *Mericalypia* ignota.

Their synonymy and geographical distribution are as follows:—

1. **G. longipetala**, *Hemsl.* in *Oliv. Fl. Trop. Afr.* i. p. 383 (1868), specimen fructifero excluso.

DISTRIB. French Guinea: Kouria, *Chevalier* 14969. Sierra Leone: Scarcies; near Kukuna, *Scott Elliot* 4741. Liberia: Kaka town, *Whyte*. Gold Coast: Ashanti; W. of Obuari, *Aininam*, *Chipp* 582. Larte Hills, *Johnson* 812. Ashanti, *Cummins* 14. S. Nigeria: Oban, *Talbot* 1361; *Dennett* 23. Cameroons: Yaunde, *Zenker & Staudt* 586; near Efulen, *Bates* 443; Bipinde, *Zenker* 1134, 3458. Fernando Po: *Mann* 17. Spanish Guinea: River Kongui; *Mann* 1813. Angola: *Monteiro*.

2. **G. longispicata**, *Engl.* *Pflanzenw. Ost.-Afr.* C. 256 (1895); *Engl.* in *Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped.* 1907–1908, ii. 490 (1912).

DISTRIB. British East Africa: Battiscombe 297; descending the Mau Plateau towards Nandi, *Whyte*. Nyasaland: Masuku Plateau, *Whyte*; Mt. Chiradzulu, *Whyte*. Rhodesia: Chirinda Forest, *Swynnerton* 96.

3. **G. pannigera**, *Tul.* in *Ann. Sc. Nat. Sér. IV.* viii. 134 (1857); *Engl. Pflanzenw. Ost.-Afr.* C. 256 (1895).

DISTRIB. Central and North West Madagascar; Portuguese East Africa: Gorungosa, (fide *Engler* l.c.).

4. **G. mozambicensis**, *M. L. Green*; species nova, *G. longipetalae*, *Hemsl.*, et *G. longispicatae*, *Engl.*, affinis, sed infructescentia laxiore fructu multo majore differt.

Frutex scandens (Kirk). *Ramuli* leviter costati, juniores pilosuli, vetustiores glabri. *Folia* ovata, apice breviter acuminata, basi cordata vel subtruncata, 5-7 cm. longa, 3.5-4.5 cm. lata, inconspicue crenata vel subintegra, chartacea, supra glabra, subtus secus nervos subappresse pilosa; petioli 2-4 cm. longi, pubescentes. *Thyrsi* laxi, fructiferi 4-11 cm. longi, rhachi plus minusve pubescente; pedunculi 5-6 mm. longi; pedicelli 2-3 mm. longi. *Flores* non visi. *Mericalpia* suborbicularia, 1.5-1.7 cm. longa, 1.5-1.8 cm. lata, manifeste reticulata, glabra, sinu basali 1 mm. longo, apicali 1-1.5 mm. longo. *Semina* 5 mm. longa, 3.5-4 mm. lata, nitida, glabra, endospermio corneo.—*G. longipetala*, Hemsl. in Oliv. Fl. Trop. Afr. i. p. 383 (1868), quoad fructum.

DISTRIB. Portuguese East Africa: Shupanga, Kirk (1860).

5. **G. Sereti**, *De Wild.* in Ann. Mus. Congo, Sér. V. ii. 45 (1907).

DISTRIB. Belgian Congo: on the borders of the forest between Niangara and Gumbari, Seret 448.

XXXVII.—A NEW EUPHORBIA FROM ST. HELENA.

A. THELLUNG and O. STAPE.

In the Report on the Botany of the Atlantic Islands Hemsley enumerated a doubtful *Euphorbia Chamaesyce* which since Burchell's day had repeatedly been collected in St. Helena where it was known as "French Grass." He says of it "We have been unable to match this, but in a genus like *Euphorbia* we shrink from founding a new species upon what may be only a slightly altered state of some well-known one, or even exactly the same as a described species. Roxburgh treated it as an introduced plant, and named it *Euphorbia rosea*, which it is not. Burchell who did not distinguish between the native and introduced plants, collected it in Sandy Bay; Melliss expressed his opinion that it is probably indigenous." Recently Dr. Thellung, of Zurich, had an opportunity of examining some fragments of the St. Helena plant and by his studies of alien plants and weeds having made himself familiar with the members of the *Chamaesyceae* group of *Euphorbia*, came to the conclusion that it represented indeed, as Hemsley suggested, a new species. Subsequently he applied to me for the examination of the fairly ample material preserved in the Kew collections and the completion of the description which he had drawn up from the samples at his disposal, the result being the confirmation of his view of the plant as an undescribed member of the *Chamaesyceae* group and the description of it given below.

Although extremely similar in general appearance to several species of the *Chamaesyceae* the structure of the involucre is quite distinct. It is distinctly 5-merous, whilst it is stated to be 4-merous in all the other species of the group. There are 5 fimbriate broad-linear segments and alternating with them 5 linear somewhat narrower and shorter segments. Of these

4 (sometimes only 3) bear at their apex a roundish yellow gland, slightly impressed in the centre, the fifth (or fourth or fifth) being produced into two horns, very like the fimbriae with or without a rudimentary gland at their base. The species does not seem to have been found so far in any other part of the world and must therefore for the present be regarded as endemic in St. Helena.

Euphorbia (§Anisophyllum) heleniana, *Thellung et Stapf* [Euphorbiaceae-Euphorbieae]; habitu simillima *E. Chamaesyce*, L., *E. humifusae*, Willd., *E. inaequilaterae*, Sond., *E. serpyllifoliae*, Pers., sed ab omnibus hisce speciebus involucri 5-mero fimbriato-lobato distincta. Caeterum differt ab *E. Chamaesyce*, cuius formis a W. B. Hemsley dubitanter adnumerata erat, foliis serrulatis, glabritie omnium partium, glandulis minimis rotundatis exappendiculatis, seminibus levissime tantum rugulosis, ab *E. humifusa* foliis crassiusculis, seminibus haud levissimis, ab *E. inaequilatera* seminibus multo levius rugulosis, ab *E. serpyllifolia* quacum seminum structura bene convenit, foliis crassiusculis. *E. ovalifolia* Engelm., involucri lobis fimbriatis quidem gaudens, differt foliis tenuibus integerrimis.

Herba annua, glaberrima, radice tenui. *Caules* prostrati, 5-6 cm., raro ad 12 cm. longi, filiformes, cylindrici, saepe purpurascens, dichotome ramosi. *Folia* opposita, crassiuscula, saepe purpureo-tincta, lati elliptico- vel oblongo-obovata, basi plerumque inaequalia, latere altero rotundato vel subcordato, altero attenuato, a medio vel saltem apicem versus subtiliter sed distincte mucronulato-serrulata, apice obtusa, 3-5 mm. longa, 1.5-3 mm. lata. *Stipulae* membranaceae, in lacinias filiformes fissae. *Cyathia* versus apices ramorum in dichotomiis solitaria, breviter (circiter $\frac{2}{3}$ - $\frac{3}{4}$ mm.) pedunculata, campanulato-turbinata, circiter 1 mm. longa, fauce nuda, lobis elongatis fimbriatis, fimbriis plerumque 3 (rarius ad 5) e cellulis 2- vel pluri-seriatis constantibus; glandulae rotundatae, centro vix impressae, minimae, stipitatae stipite appanato, appendicibus nullis. *Flores* ♂ circiter 4. *Capsula* circiter 1.5-2 mm. longa, 1.5 mm. diametro, coccis dorso carinatis; styli breves, breviter 2-fidi. *Semina* oblongo-ovoidea, tetragona, paulo ultra 1 mm. longa, $\frac{2}{3}$ mm. lata, aurantiaca vel pallide fusca, faciebus fere laevibus, medio tantum rugulis transversis perpaucis levissimis undulatis.—*E. rosea*, Roxb. in Beatson's St. Helena Tracts, p. 308; Melliss, St. Helena, p. 319, non Retz. *E. Chamaesyce*, (var. vel species nova?), Hemsley, Bot. Challenger Exp. vol. i. p. 82, non Linn. *E. prostrata* Burch. exs. No. 110 ex Hemsley, l.c., non Ciet.

ST. HELENA. Potato Bay, 1809, *Burchell* 110; lower barren rocky parts, 1867, *Melliss*; without precise locality, *Haughton*; *Whitehead*.

XXXVIII.—MINOR AGRICULTURAL INDUSTRIES: IV.

CULINARY HERBS.

W. DALLIMORE.

A good deal of attention has been paid during the last few months to the cultivation of medicinal herbs, but little notice has been taken of the cultivation of flavouring or culinary herbs although it is an industry of some importance amongst cottagers and small farmers in the neighbourhood of certain large towns. In south-west Lancashire such herbs are very popular under the name of pot-herbs and they find a ready sale in Liverpool, Bolton, Manchester, Bury and many other places.

During the autumn of 1915 an opportunity occurred of visiting a number of farms and cottage gardens in the Lancashire villages of Maghull, Lydiate, Aughton, Scarisbrick and Narrow Moss, where pot-herbs are well grown, and the following notes are based largely upon information gleaned during that visit.

The work appears to be confined to small farms and cottage gardens, farmers with large holdings rarely troubling about the business. In some instances cottagers specialise on the work, whilst in other cases a few beds of herbs are included amongst other market crops. Very often the work of cultivation and preparation for market is left almost entirely in the hands of women, the wives of farm servants accepting it as part of their home work. In other cases the cultivation of pot-herbs is included in the routine of the ordinary work on small farms, but even then much of the work is left to women.

The herbs most in demand are thyme, sage, marjoram, mint, and parsley. The soil in that neighbourhood is generally light and it is usually heavily manured for potatoes or some other crop before being planted with herbs. As a rule the herbs are planted in beds about 4 ft. wide, for convenience of handling, although wide breadths are sometimes seen.

Thyme is very popular and two kinds are grown, one of annual duration, the other perennial, and they are known respectively as "annual" thyme and "stock" thyme. Seeds of the former are sown out-of-doors in spring and gathering commences as soon as the plants show signs of flowering. The plants are cut over close to the ground or pulled up by the roots and tied in small bundles, a bundle being as much as can be conveniently grasped in one hand. The stock thyme is increased each spring by division. Small plants are put out in March which, by the end of summer, are a foot or more across. Gathering begins as soon as the annual kind is over. The plants are cut down to the ground and the roots are afterwards ploughed up, the necessary number of plants for division for the following year's crop being retained. Both thymes were identified at Kew as forms of *Thymus vulgaris*, L.

Sage of two kinds is also grown under the names of "annual" and "stock" sage. The first-named is grown from seeds sown

in spring, the other from layered branches or sometimes from cuttings. Annual sage is collected when fully grown but before the flowers open if possible, and the stock sage is reserved for later use. As in the case of thyme the best results are obtained from young plants. Both sages are forms of *Salvia officinalis*, L. In one or two cases a purplish-leaved form of sage was noted but it was not general.

Marjoram or “Sweet Marjoram” (*Origanum Marjorana*, L.) is grown from seeds sown broadcast in beds in May. The crop is collected towards the end of summer just as the plants are coming into flower. It is almost as popular as thyme for flavouring purposes and large quantities are grown. When collected it is tied in bunches like thyme and sold wholesale at from 5d. to 9d. a dozen bunches.

Mint (*Mentha viridis*, L.) is not grown by so many people as the other herbs, but is usually in larger areas. The shoots are collected from early spring to late summer and some people lift plants and place them in frames in late autumn so as to advance growth during early spring. Plantations are not allowed to stand long on the ground, better results being procured from young stock. When forming plantations rooted shoots are dibbled into well-worked land during moist weather in spring.

Parsley is usually sown broadcast in beds, sometimes alone but often with onions, the onions being pulled early and the parsley left to form the main crop. Formerly other herbs were cultivated, such as pennyroyal, horehound, tansy, chamomile and wormwood, but it is said that there is very little call for them now, and they are not grown in quantity in the district in question.

Marketing is almost entirely by the bunching method, a bunch being as much as can be conveniently grasped in one hand and the growers usually sell wholesale, sometimes to buyers who visit the gardens, but more often in the open market. Much of the produce is sent to market by road, cottagers usually arranging to send small quantities on neighbouring farmers' carts, the farmer or his agent acting as seller. Prices vary from time to time. Last September, thyme, sage and marjoram were selling wholesale at from 5d. to 9d. a dozen bunches, whilst in the retail market at Liverpool from 1d. to 1½d. per bunch was asked. Some growers have erected drying sheds and when prices for green herbs are low, they dry their produce and store it until better prices can be obtained. Other growers supply regular customers, and one man informed me that he supplied a considerable quantity of dried herbs to certain shipping companies.

Although the business is not one for indefinite extension it is well worth the attention of small holders in the vicinity of large towns, for, apart from the actual preparation of the ground the work is not difficult and can be conducted by women and children. Whether it would pay to cultivate any of these subjects, or others such as lavender and peppermint for the distillation of

oil would be a matter for experiment in particular districts, but for such work it would appear that success could only be expected by a proper system of co-operation amongst the growers.

During my visit I was greatly impressed by the general good cultivation of the crops, which was particularly noticeable on a number of small holdings, each about one Cheshire acre (a little more than two English acres) in extent, at Narrow Moss, and on a farm near by. These small holdings were excellently cropped and very clean. The tenant of one told me that his was worked entirely by the spade and his only assistant was an elderly female relative. The greater part of the land was given over to thyme, sage and marjoram, and his produce was marketed in several towns mostly to regular customers. In the other case a portion of a farm was given over to herb and flower cultivation. The preparation of the land was done as far as possible by horse labour, the remainder of the work being carried out by one of the farmer's daughters, assisted by her father, a man over 70 years of age. The land was excellently worked and very clean. Although entirely self trained this lady had evidently solved the problem of the cultivation of every plant she had taken in hand. Some idea of her work may be gleaned from the fact that she sends the flowers of an annual *Gypsophila* to market by the wagon-load.

XXXIX.—MISCELLANEOUS NOTES.

Baobab trees used for storage of water.—In *Kew Bulletin*, 1910, p. 98, an extract was given from an article in the *Geographical Journal* on the storage of water in the hollow trunks of Baobab trees (*Adansonia digitata*) in the Sudan. We have recently received the following account of these trees from an officer in the Darfur Campaign:—

“On our side of the border in Kordofan they have no wells for perhaps hundreds of miles, and live in the dry season on water stored in hollow trees, called *tebeldis*. They are ugly bottle-shaped trees, all trunk, from 6 ft. to 20 ft. thick, and a good one holds 1000 gallons. Each family owns certain trees and each tree has its own name. They scrape a small pond at the foot, and after a shower everyone turns out to fill *tebeldi* trees. A man stands at the top of the bole about 20 ft. up, hauls the water up in a skin bucket and pours it into the tree. It keeps very sweet and is better than well water. Ali Din Nar frightened our people by promising to send across and cut the *tebeldis*; if he had done it, the country would have become uninhabitable. No one has ever seen a young *tebeldi*, and no one knows how old the custom is, but most of Kordofan must have been uninhabited, except by nomads in the rains, until someone thought of filling the trees.”

Another account of the use of the trees for storing water is given by Major C. Percival in his paper on Tropical Africa in the *Geographical Journal*,* and is as follows:—

“Two further instances of ancient customs have come under my notice, and are worth relating here. In the fourteenth century, when the African historian, Ibn Batuta, made his journey across the desert from Morocco to the Niger, he relates how ‘water was stored in trees by the people’; this custom is still common in Kordofan to this day. The tree is the Baniant† or Tebeldi tree (*Adansonia digitata*); it is hollowed out when necessary, and is in some cases mended with bricks and cement. The trees are filled up by the Arabs during the rains, and are a source of income to their owners through the sale of the water to travellers. The same traveller, Ibn Batuta, mentions the keeping of bees in hollow trees for the sake of the honey. This is a common practice in the Sudan, where hollow trunks, stopped with mud, are placed in trees by the natives with a view to attracting the bees for the sake of their honey.”

Ibn Batuta was born about the year 1303 A.D., and died about the year 1377. The date of the publication of his travels is some time between 1349 and 1377. The following extract is the passage to which Major Percival refers in his article:—

“I then proceeded from Abu Latin to Mali, the distance of which is a journey of four-and-twenty days, made with effort. The roads are safe, so I hired a guide and proceeded with three of my companions. These roads abound with trees, which are high, and so large that a caravan may shade itself under one of them. As I passed by one of these trees, I saw a weaver weaving cloth within a cleft of its trunk. Some of these will grow so corrupt that the trunk will become like a well and be filled with the rain-water, and from this the people will drink. Sometimes the bees will be in these in such numbers that they will be filled with honey, which travellers take for their use.”‡

Botanical Magazine for July, August and September.—

The plants figured are *Paeonia Willmottiae*, Stapf (t. 8667), from China; *Cirrhoptalum concinnum*, Hook. f., var. *purpurea*, Ridl. (t. 8668), from the Malay Peninsula; *Rhododendron Hanceanum*, Hemsl. (t. 8669), from Szechuan; *Brachystelma oianthum*, Schlechter (t. 8670), from South Africa; *Pandanus furcatus*, Roxb. (t. 8671), from India; *Viburnum betulifolium*, Batalin (t. 8672), a native of Central China; *Euphorbia Caput-Medusae*, Linn. (t. 8673), from South Africa; *Mesembryanthemum transvaalense*, Rolfe (t. 8674 A.) and *M. tuberculatum*, Rolfe (t. 8674 B.), both natives of South Africa; *Rhododendron monosematum*, Hutchinson (t. 8675), from Western China; *Ursinia cakilefolia*, DC. (t. 8676), a native of South-West Africa. *Lonicera tatarica*, Linn. (t. 8677), ranging from

* Tropical Africa, on the Border Line of Mohamedan Civilisation, in *Geographical Journal*, vol. 42, p. 253 (1913).

† The true Banyan or Banian of India is *Ficus bengalensis*, L.

‡ Extract from Travels of Ibn Batuta.—Lee, p. 235. Translation 1829.

South-Eastern Russia to Siberia and *Acacallis cyanea*, Lindl. (t. 8678), a native of the Upper Amazon region.

Stipa Neesiana in England.—Mr. A. T. Rake, of Lawn Crescent, Kew Gardens, recently submitted for identification a *Stipa* found by him on a rubbish heap in Mortlake. It proved to be identical with the species described by Godron from Port Juvénal as *Stipa intricata*, and identified long afterwards with the South American *S. Neesiana*, Trin., or as Spegazzini thought, *S. setigera*, Presl. The grass was first recorded as far as European stations are concerned from Port Juvénal, the classical collecting ground of aliens near Montpellier.

Port Juvénal is the name of an enclosure with a wharf on the Lez canal, close to the gates of Montpellier. It was here that for over a century and a half or may be two centuries* the wool imported into Montpellier from the Mediterranean countries and later on from other parts of the world was unloaded, washed and dried for the cloth factories established near by. The wool was passed through a hot bath, washed in the river, and then spread out on gravel beds, divided into yards by stakes and sheets of coarse linen. The ground was naturally kept damp, which in connection with the high temperature of a southern climate, favoured the germination of the numerous seeds brought in with the wool. On the other hand the process of washing which involved plucking and several passages through tourniquets placed in the river must have reduced their number very much, whilst the treatment which the alien vegetation experienced during its development, such as repeated weeding, exposure to cloth which impregnated with sulphur vapours was occasionally spread over it, and the keen competition of the indigenous weeds, was unfavourable to their permanent establishment. Indeed, we must not imagine those drying yards as a botanic garden of exotics, as they have sometimes been called, but as casual nursery beds where those alien plants would come and go so that only a limited number were seen together at a given time, and long continued observation and much perseverance was required to collect the material for a florule of the place. It was mainly due to the indefatigable zeal of Touchy that Godron was enabled to write his "*Florula Juvenalis sive enumeratio et descriptio plantarum e seminibus exoticis inter lanas allatis enatarum in campestribus Portus Juvenalis prope Monspelium*," published in 1853, and in a second edition in 1854. The second edition contained 386 species, of which 57 were then new to science and mostly (51) of unknown origin. An appendix to this *Florula Juvenalis* by M. E. Cosson (in Bull. Soc. Bot. France, vol. vi. (1859) p. 607) brought the number up to 458, and a second appendix (in Bull. Soc. Bot.

* According to G. Planchon (*Des Modifications de la Flore de Montpellier*, p. 39), in 1700 the guild of wool merchants was authorised to use the place for drying their goods; but certain terms in the deed suggest that the neighbourhood of the wharf served for the purpose since the construction of the canal in 1686.

France, vol. xi. (1864) pp. 159-164) to 505. Several more have been added since, and Thellung in his masterly "Flore adventice de Montpellier (1912)," p. 611, estimates the number of all the exotic species recorded so far from the classical spot at 527. The drying yards of Port Juvénal were abandoned about 1880, and in 1905 Thellung found there only 10 species which had survived in the struggle with the autochthonous vegetation, most of them perennials. *Stipa intricata*, or as we must now call it. *S. Neesiana*, was not among them. It had been first observed by Touchy in 1847, and last by André in 1879. This excludes, of course, all connection between the Mortlake plant and Port Juvénal. It no doubt was introduced into the latter place more than once with different consignments of wool from South America, the imports from there beginning about 1830. When Port Juvénal was closed it still continued to come in and to spring up as a casual visitor in other places under similar conditions, such as the drying yards of Montplaisir, near Lodève, and of Bedarieux on the river Orb, both in the Hérault (Thellung, l.c. 94), the banks of the Polcevera near Genoa (Sommier in Bull. Soc. Bot. Ital. 1904, p. 115), below some tan yards which receive their hides from the Argentine, or even far inland, in the neighbourhood of the Rodleben wool factory at Rosslau, Anhalt, Germany (Zobel acc. to Höck in Beih. Bot. Centralbl. vol. xxvi. 1910) p. 430), and near the Humboldts-Mühle, Tegel, Berlin (O. Schulz in Verh. Bot. Ver. Pr. Brandenb. vol. xl. p. lxxxiii.). The only other European locality where our *Stipa* was observed so far is on the beach below St. Hélène and Carras, Nice, where it was found growing in robust tufts (Goiran in Bull. Soc. Bot. Ital. 1909, p. 149), apparently unconnected with factories or landing places, but in reality no doubt traceable to them.

Godron said of his *Stipa intricata* "*Patria ignota*," but when in 1898 O. Schulz found the plant as a casual at the Humboldts-Mühle at Tegel, he pointed out (in Verh. Bot. Ver. Pr. Brandenb. xl. p. lxxxi.) incidentally that it had been identified with certain specimens collected by Lorentz and Hieronymus near Siambon (Tucuman) and Catamarca in the Argentine. Ascherson and Graebner (Syn. Mittel-europ. Flor. ii. (1898) p. 113) confirmed this statement, adding that Grisebach had named the Argentine plant referred to, *S. Neesiana*, Trin., a determination which seemed to them sufficiently doubtful to retain *S. intricata* as a distinct species. A comparison, however, of the Mortlake plant which is an exact counterpart of the Port Juvénal specimen in the Gay Herbarium at Kew with a co-type of *S. Neesiana* from Sellow's collection, and the rather ample material of this species from other localities, leaves no doubt about the identity of *S. intricata* and *S. Neesiana*. *S. Neesiana* is a very variable plant in the habit of the panicle, the glabrousness or hairiness of the leaves, and the colouring of the spikelets. In so far as the last character is concerned, the Mortlake specimen corresponds to Spegazzini's variety "*versicolor*" (*Stipeae Platenses* in Anal. Mus. Nac. Montevideo, vol. iv. p. 97). Whether the colouring of the spikelet is indicative of

more than a fluctuating state is doubtful. Its varying grades in any case do not coincide with definite areas of distribution. Spegazzini (l.c. p. 94) reduces *S. Neesiana*, Trin. to "*S. setigera*, Presl (non auct. Americae Nordicae!)" Unfortunately we do not know where Haenke's specimen came from nor is Presl's description sufficiently clear to decide the question of the identity of *S. setigera* with *S. Neesiana*. Hitchcock (*Gramineae* in Jepson, "A Flora of California," 1912, p. 105) accepts *S. setigera* as distinct from *S. Neesiana* and gives its area as from California "east to Texas and south into Mexico"; but he omits it from his "Mexican Grasses" (in *Contrib. U.S. Nat. Herb.* vol. xvi. part 3, 1913). Such Californian specimens of *S. setigera* as I have seen are certainly not identical with *S. Neesiana* and as Hitchcock had the opportunity of studying Presl's types in the National Collections at Prague, we may assume that he is right, and retain therefore the name of *S. Neesiana*, Trin. for the South American grass.

The area of *S. Neesiana* covers parts of Southern Brazil, the whole of Uruguay and the Argentine, south to the Rio Negro and west to the Andes. According to Spegazzini it is very common (vulgatissima) throughout the pampas from the Rio Negro to Salta. Stuckert (*Graminaceas Argentinas* in *Anal. Mus. Nac. Buenos Ayres*, vol xi. (1904), p. 99) says it is fairly good fodder, but extremely troublesome when in fruit as the sharp hard calli of the spikelets quickly bore themselves into the skins of animals, causing painful wounds. The grass is known to the natives as *Flechilla*, i.e., Little Dart, a designation which is certainly not inappropriate.

Nothing definite is known as to how the grass reached its station at Mortlake, but the rubbish heap having been formed from the refuse of a dust destructor close by where hides are frequently destroyed we may infer that spikelets attached to hides, probably from the Argentine, were introduced with them, became detached somehow, and finally found their way to where at present (August 11th) the fine vigorous clump of *Stipa Neesiana* stands. The grass is a perennial and the clump in question must have stood at least one winter and appears, therefore, quite hardy. No other Argentine or South American plants have so far been seen associated with it, but it may be mentioned rather as a curious fact than a circumstance connected with the grass, that a large crop of vigorous date palm seedlings has sprung up in the same locality.

O. S.